

# The Canadian Entomologist.

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VOL. XLVI.

LONDON, OCTOBER, 1914

No. 10

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## DR. WILLIAM SAUNDERS, C. M. G.

On Sunday afternoon, September 13th, after an illness which had continued for nearly two years, and which for a twelve-month had rendered him mentally incapable, Dr. William Saunders passed to his rest at his home in London, Ontario, in the 79th year of his age. He was born in Devonshire, England, and came to Canada with his parents when a boy of twelve. His educational advantages were meagre, but he succeeded in obtaining a technical training in Chemistry and set up in business as a retail druggist in London. His agreeable manners, thorough honesty and untiring industry brought him a fair measure of success. His love of nature led him to the collection of wild plants and insects which could be found in abundance in the neighbourhood, and he became an ardent student of Botany and Entomology. Finding many medicinal plants readily obtainable, he began the preparation of fluid extracts, which were so pure and reliable that they soon became widely and favourably known among the medical profession, and led by degrees to the establishment of an extensive and lucrative business both wholesale and retail. Years later, when he became Director of the Experimental Farms of the Dominion, the wholesale business was transferred to his eldest son, Mr. W. E. Saunders, by whom it is still successfully maintained, and the retail department to two of his younger sons, who, however, afterwards relinquished it for other pursuits.

During the five-and-twenty years of his business life, Mr. Saunders found time for taking an active part in many other things. Besides his scientific work in Entomology and Botany, he took great interest in fruit-growing, establishing a farm of his own near the city, and becoming a zealous member of the Ontario Fruit Growers' Association, of which he was a director for many years and President from 1882 to 1885. In connection with his professional work he was appointed Professor of Materia Medica in the Western University, Public Analyst for Western Ontario, and

President for two years of the Ontario College of Pharmacy, of which he was one of the founders. He was an active member of the American Pharmaceutical Society, and Fellow of the American Association for the Advancement of Science. His attendance at the meetings of these Societies held from year to year in various cities of North America caused him to have a widely extended friendship with notable men of all kinds, by whom he was highly esteemed and respected.

The writer's acquaintance with Dr. Saunders began more than fifty years ago, when we were both young men, and soon ripened into a warm friendship, which has continued unbroken until now during all these years. In those early days, when the study of Entomology was so difficult owing to the scarcity of books on the subject, we were in constant correspondence, helping each other in every way we could, and spending each summer some days together, comparing notes, studying specimens and making collecting expeditions. Many happy hours we spent together in early morning tramps to the ponds and woods about London, and in the evening, when his day's business was over, in examining the captures we had made. At that time there were few in Canada who took the least interest in the objects which to us afforded the keenest pleasure, but as time went on we found here and there a congenial spirit, and were led on in 1862 to attempt the organization of an Entomological Society. This was successfully accomplished during the following spring, and last year the completion of half a century's work and progress was celebrated by the Jubilee meeting at Guelph. An account of the proceedings on that occasion and the history of the formation and growth of the Society have been given in the November (1913) number of the "Canadian Entomologist" and the 44th Annual Report of the Society. In 1868 Mr. Saunders and the writer decided upon making another venture and began the publication of the "Canadian Entomologist," to the first two numbers of which we were the sole contributors. For five years the latter was the Editor, and was then succeeded by Mr. Saunders, who continued the management of the magazine until his removal to Ottawa in 1886. Three years previously there was published in Philadelphia his notable book, "Insects Injurious to Fruits," which is justly regarded as a classic by economic entomologists.

A second edition was issued in 1892, and the author had begun the preparation of a third, when his prolonged illness rendered him incapable of accomplishing any literary work. A list of his published articles, bulletins, reports, etc., fills six columns of the Bibliography in the Transactions of the Royal Society of Canada for 1894, and a large number have been added since. In 1881 he had been appointed by the Governor-General of Canada, the Marquis of Lorne, one of the original Fellows of the Royal Society, and in 1906 he was elected President, having thus risen to the highest position of honour for scientific work that can be attained in this Dominion. Twenty years ago it was said of him by an American writer that "by painstaking study and observation he has risen to the topmost pinnacle of fame as an entomologist, horticulturist and experimental agriculturist."

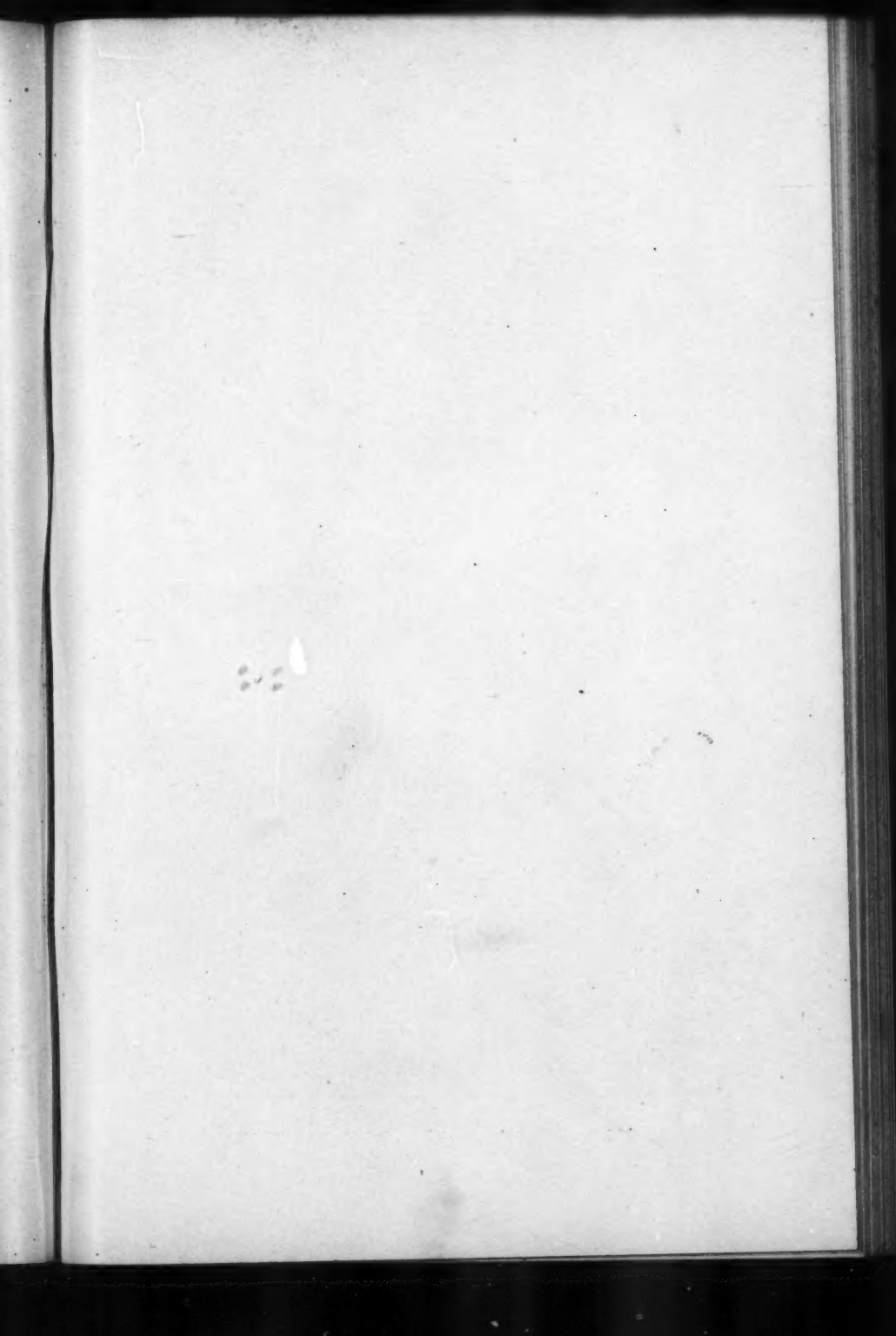
A very important change took place in the life and work of Dr. Saunders in 1886, when he was appointed Director of the Experimental Farms of the Dominion, and left his home and business in London to reside in Ottawa. During the previous year, he was commissioned by the government to visit various Experiment Stations in the United States and to report upon agricultural and experimental work in Europe and America. In this new sphere of labour he applied himself with his wonted vigour, and in the course of a few years was mainly instrumental in bringing these establishments into thorough working order and into a high standard of excellence. Anyone who saw the Ottawa Farm in the autumn of 1886—a large tract of bare land, with workmen busily employed in levelling and removing stumps and boulders with dynamite—and then visited it ten or fifteen years later (as did the writer), could not fail to be impressed with the wonderful work accomplished by the genius of Dr. Saunders in turning a waste into a scene of beauty and a hive of industry. Here have been carried on under his direction a great variety of experiments in breeding and feeding live stock, testing soils and water, growing fruit and ornamental trees of all kinds, selecting hardy varieties, improving the size and quality of any fruits suited to the climate of the Western Provinces, beekeeping, experiments and observations in economic entomology, plant pathology, and various other matters pertaining to the welfare and benefit of the farming community. Especially

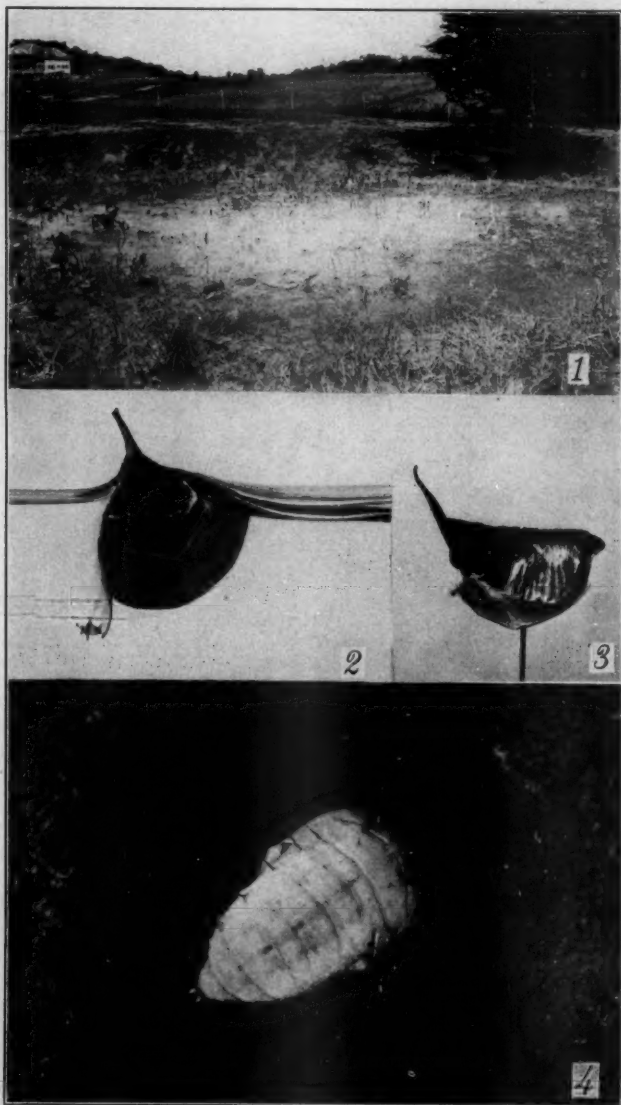
noteworthy was his work in crossing varieties of grain and producing new and improved kinds. One alone of these, the Marquis Wheat, is believed to have added millions of dollars to the value of the wheat products of the prairie country. All information thus acquired has been freely afforded to the farmers by distributions of seed, and bulletins and reports on all manner of subjects.

The ever-growing work and its extension in every Province of the Dominion began at length to tell upon the physical strength of the man who was the mainspring of it all. His vitality, owing to advancing years and the inroads of an insidious disease, began to fail, and he felt the time had come for his retirement. Accordingly he resigned about three years ago and went with his wife and daughter for a pleasure trip to Europe—his first real holiday since he went to Ottawa. His friends expected him to return with much improved health, but it was ordered otherwise; he became very ill in England and never entirely recovered. He had completed his life work, his duty was well done, and he has left the record of great deeds accomplished and of vast and widespread benefits conferred upon the people of the land. This account of a remarkable man would be incomplete without a reference to his beloved wife, who was a true helpmeet both in small things and in great, ever cheerful and encouraging, full of kindness and hospitality, perfectly unassuming and free from all affectation, she is loved and esteemed by all who know her, and her children and friends rise up and call her blessed. To her in her desolation and to her family in their sense of loss our sympathies go out in the fullest measure.

The ability and work of Dr. Saunders have been recognized in many gratifying ways. In 1905 he received the distinction of Companion of the Order of St. Michael and St. George, conferred by his Majesty King Edward; honorary LL.D. from Queen's University in 1896 and from the University of Toronto in 1904; the Mantua gold medal for distinction in scientific knowledge. He was a Fellow of the Entomological Society of London and the Royal Microscopical Society; an honorary member of the Pharmaceutical Society of Great Britain and of the Highland Agricultural Society of Scotland; and an ordinary member of a large number of Scientific Societies in the United States and Canada.

C. J. S. BETHUNE.





*HYDROPHILUS TRIANGULARIS* SAY.



NOTES ON *HYDROPHILUS TRIANGULARIS* SAY\*

BY ROBERT MATHESON, PH. D., ITHACA, N. Y.

Although much study has been given to the European species *piceus* and much has been written of its life-history, anatomy and metamorphosis, scarcely anything has been published concerning the American species *triangularis* Say. Since the brief account given by H. Garman in the American Naturalist in 1881 I find but few references to this species in American literature. As this is one of our largest beetles, and is commonly met with in aquatic collecting, I hope this short account gathered from a brief study during the summer of 1912 may be of use to others working in this group.

The beetles undoubtedly hibernate and egg-laying occurs early in June. Garman found the egg-cases about the first of June at Normal, Ill., and in one case the female was in the act of finishing her case. I found the completed egg-cases at Ithaca on June 24 and 26. These egg-cases are peculiar and interesting structures. Although Garman has given a good description of the nidus, it may be worth while to redescribe it, as his paper is now inaccessible to the average worker in entomology.

The egg-case (pl. XXII, fig. 2) is always attached to pieces of floating leaves, bits of weeds, etc., and never, as far as I know, to living plants. The case with the projecting horn-like mast floats gracefully on the surface of the water. The cases must be sought with considerable care, as they are not easily recognized among the floating debris. I have found them most commonly in shallow pools with abundant vegetation and rich in insect life (Pl. XXII, fig. 1.) The leaf to which it is usually attached serves as a float and aids in keeping the mast erect and above the surface of the water. The case is smooth, brownish in colour, the upper surface closely adhering to its support (Pl. XXII, fig. 2.) It measures about 22 mm. wide, 24 mm. long and 15 mm. deep. The horn-like process is usually about 7-8 mm. long, and projects from the front of the case almost at right angles to the upper surface. It is dense, hard and almost black in colour, composed of closely-woven strands of silk. Below it expands into a broad hatchet-shaped plate, as seen in figure 2. It is supposed that this horn, which is really a very

\*Contribution from the Entomological Laboratory of Cornell University.  
October, 1914.

small tube with dense walls, functions in the admission of air into the egg chamber. Whether this is so or not I could not determine in the few experiments I performed. Below the broad expanded base of the spine is a narrow lunar-shaped opening (figs. 2 and 3). This allows the entrance of water beneath the egg-case proper, and through it the newly-hatched larvæ escape. This outer sheet of silk enveloping the egg-case is very thin and semi-transparent. Through it one can readily observe the young larvæ as they hatch and crawl into this space before venturing out into the open pond.

The eggs form a disk-like mass suspended from the roof of the egg-case (Pl. XXII, fig. 3.) They are all arranged vertically, closely applied to each other and in a single layer. Above the eggs the roof is composed of a considerable thickness of rather loosely-woven silk, leaving comparatively large, open spaces. Each egg measures 4 mm. long and about 1 mm. in diameter, yellow in colour, and loosely wrapped in its own coat of silk. Although I have examined these egg-cases carefully, I have never found any water in the portion containing the eggs. It would seem as if the open spaces in the loosely-woven silk and connected with the horn-like process in front serve as a means of air supply for the developing embryos. The number of eggs in a single case is very large, and it is not known how many egg-cases may be made by a single female. In the two egg-cases counted there were 112 and 130 eggs, while Garman found 107 in the one counted by him.

The young larvæ on hatching do not immediately leave the egg-case. On the evening of June 25th I saw quite a number of the newly-hatched fellows crawl out into the space below the eggs, but they did not venture further. Next morning this space was literally swarming with them, so crowded that they could not attack each other. Shortly after they began to emerge; slowly at first and then more rapidly. Soon the small aquarium was a seething mass of wriggling savages. They nipped at each other fiercely, each shying off, but soon one got a death-grip. The successful grip is directly back of the large head (fig. 29), for then the larva is helpless, and the other little savages soon close in and complete the killing. One is not much of a feast for over a hundred hungry chaps, and the first taste is only the beginning. After considerable manœuvring; another is seized and the



feast is again repeated. This would have continued, I presume, till all but one were killed. To prevent it I placed in their midst a young tadpole which had just died. For a short time they seemed shy of it, such a feast was surely too good, but when they closed in it was with a rush. Soon there was nothing to be seen but a wriggling mass of fierce savages tearing and biting at every available spot. As one secured a tender morsel he would rush off with it, hoping to enjoy it in peace, but only to be attacked by his neighbour. This fighting and scrambling continued until the entire tadpole was devoured. Later in the evening of the same day I gave them a dead minnow, and next morning only the bones were left. In the meantime one would occasionally succumb to the attacks of his neighbours, and my stock was slowly decreasing in numbers. On June 28 I placed a living tadpole in the aquarium, and there followed a savage attack on it. The larvæ seized it by the tail, mouth, and eyes, and every available spot where a grip could be secured was tried time and time again. It was not long before they succeeded in overcoming the tadpole, and then followed a feast mingled with occasional cannibalistic attacks. For sometime after this I continued to feed them on tadpoles, and they seemed to thrive.

On July 3rd one larva molted. This one was separated from the rest, and an attempt made to rear it. The next day most of the other larvæ died on account of the extreme heat. The one that had molted continued to thrive on tadpoles, snails or other food which I gave it. It was interesting to see how readily it would remove a snail from its shell by means of its powerful mandibles. The flattened head made it easy to get under the shell, and the mandibles did the rest. On July 24 this larva entered the soil to pupate. It had evidently molted a second time, but I had failed to find the shed skin, or else it was eaten by the larva itself. It took a little over twenty-four hours to dig out a large pupal cell under a stone in the rearing-cage. Pupation occurred on July 26, and the pupa resting in its cell is shown in figure 4. The adult emerged on the 6th. The time of development is then as follows:

June 25.—Young larvæ began emerging.

July 3.—First molt occurred.

July 13 (about).—Second molt occurred (?) (Supposed, not observed).

July 24.—Entered the soil to pupate.

July 26.—Pupa formed.

Aug. 6.—Emergence of adult.

Two other larvæ which I collected the same season pupated on July 15th and the adults emerged on the 25th.

At the time of transformation of pupa to adult it is interesting to observe how long it requires for the beetle to acquire its normal black colour. At the time of transformation to adult the thorax, head and legs are bright reddish brown. The rest of the body is pure white. Gradually it becomes reddish brown, turning to black. In about twenty-four hours after transformation the beetle is perfectly coloured and ready to emerge.

*Description of larva.*—First stage (fig. 29). The young larva on leaving the egg-case is light brown in colour, later becoming dark velvety brown and measures over 8 mm. in length, from the tip of the abdomen to the tips of the extended maxillæ. The head is large, light brown in colour, somewhat depressed and prominent, the mouth-parts forming a very conspicuous feature. It measures, exclusive of the extended mouthparts, 2 mm. long by 2.25 mm. wide, and appears very



Fig. 29.—*H. triangularis*, young larva just hatched.

large in proportion to the body, the thorax measuring less than 1.5 mm. wide. The antennæ are prominent, each consisting of three segments. The ocelli are six in number, placed in two parallel rows at the side of the head, directly behind and below the antennæ.

The body is densely clothed with dark hairs, giving the larva a velvety appearance. Amongst the hairs may be found scattered brown setæ. The seven abdominal spiracles are prominent. On the dorsal side of the last abdominal segment are openings leading to the large longitudinal tracheal trunks which supply air to all parts of the body. This pair of spiracles, with the two pairs on

the thorax, make in all ten pairs. I have not attempted to determine whether the lateral spiracles are closed or not.

Arising from the under side of the last segment is a pair of light coloured cerci, cylindrical, soft and flexible, measuring .9 mm. in length. The function of these cerci is not known, unless they serve to aid the larva in maintaining itself on the surface film when it requires a fresh supply of air.

The legs are long, of the same colour as the head, and well fitted for walking or running. The femora of all three pairs of legs are also provided with swimming fringes. The larvæ, however, are not very capable swimmers, only swimming short distances between supports.

*The mature larva.*—(Fig. 30.) The larva ready to pupate measures 40 mm. ( $1\frac{9}{16}$  ins.) long and about 9 mm. wide at its widest part. It is dark brown in colour, the head being reddish brown.

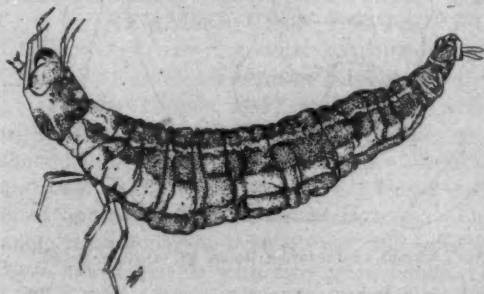


Fig. 30.—*H. triangularis*, mature larva.

The under surface of the body is almost a grayish brown. The legs are the same colour as the head. Extending from the anterior margin of the thorax

on each side of the median line to the tip of the abdomen is an irregular narrow grayish brown line. These lines stand out prominently in alcoholic specimens.

The head is large, depressed, reddish brown in colour with numerous darker markings. It is not out of proportion to the rest of the body, as in the case of the young larva (compare figs. 29 and 30). The antennæ are located on the upper side of the head, 4-jointed, 1st joint, 3.25 mm.; 2nd, .24 mm.; 3rd, .64 mm.; 4th, .64 mm. (Figure 31). An antennal sclerite is present and well differentiated. Each eye consists of six ocelli, situated behind and below the antennæ in two parallel rows of three each.

The mouthparts are well developed and prominent. The suture between the labrum and clypeus is very indistinct or lacking. The clypeus-labrum is black, broadly emarginate in front. The mandibles are large and powerful. The right is more slender, longer and more strongly curved with a large tooth on its cutting edge. The left is shorter and thicker, and lacks the large tooth, though a slight elevation marks the position (fig. 31).

A maxilla is shown in figure 31. The maxillæ stand out prominently, particularly in the young larvæ. The cardo is

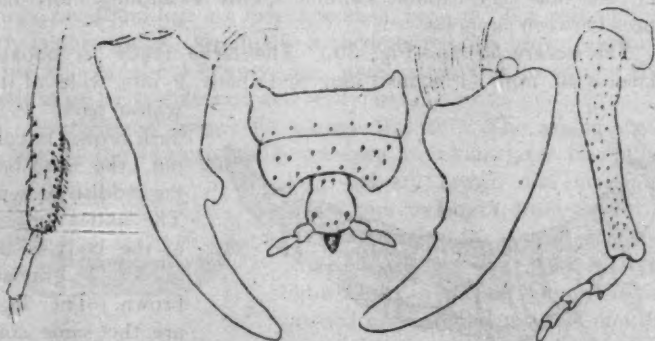


Fig. 31.—(From left to right.) Antenna, right mandible, labium, left mandible, maxilla.

greatly elongated, the lacinia being reduced to a mere joint. The palpus is 3-jointed.

*The pupa.*—The pupa at time of transformation is pure white in colour, the eyes soon becoming dark, while the prothorax soon takes on a reddish-brown tinge. It measures, including the cerci, 24 mm. long by 14.5 mm. wide at its broadest part. The pupa rests in its chamber, as shown in figure 4, and is quite active when disturbed or exposed to the light, turning over or changing its position by sudden muscular contractions of the abdomen. The tender pupa does not come in contact with the soil, but rests on large, strong spines. (Pl. XXII, fig. 4).

The head lies incurved under the prothorax, and is not visible in a dorsal view. It is perfectly smooth, lacking spines or setæ.

The anterior margin of the pronotum at each side bears three long, backward-curving spines. Near the posterior margin there is a row of eight shorter spines. There are also several very short spines on the disk. On the dorsum of both the second and third thoracic segments is a pair of spines. The dorsal side of each of the first seven abdominal segments bears a transverse row of four spines (Pl. XXII; fig. 4). The spines of the outer row are much longer and dark brown at the tips. The ninth segment terminates in a pair of long, large cerci nearly 3.5 mm. long. In the pupal chamber the pupa normally rests venter downward, resting on the large curving spines of the pronotum and the cerci. On turning over it rests on the dorsal spines of the abdomen and thorax, so that the tender pupa is never brought directly in contact with the soil.

DESCRIPTIONS OF FOUR NEW TABANIDÆ, WITH  
REMARKS UPON *CHRYSOPS CURSIM*.

BY C. P. WHITNEY, MILFORD, N. H.

*Tabanus birdiei*, n. sp.

*Female*.—Length 14-17 mm. Face white, densely covered with white hairs. Palpi yellow, slender, sparsely clothed with short hairs, extreme tip infuscated. Antennæ: two basal joints and base of third reddish yellow. Upper extremity of first joint black and covered with short black hairs. Third joint with upper angle rectangular or even obtuse, the joint beyond angle black. Eyes naked, purple with two green bands. Front wide, parallel, reddish brown, densely covered by white pollen and scattered erect black hairs. Callus prominent, shining brown, nearly square with a short, stout, tapering prolongation above. Thoracic dorsum brown with strongly marked white lines. Abdomen brown and white, the latter predominating and occupying the posterior margins of the segments, expanding into three rows of triangular spots. Venter yellowish, covered with white pollen. Legs tawny, tips of tibiæ and tarsi infuscated. Wings hyaline, large distinct clouds on cross-veins, divarication of third vein and at extremity of anal cell. First posterior cell somewhat coarctate.

Nine females, March and April, West Palm Beach, Fla. Named in remembrance of a young friend to whose kind assistance I am indebted for many fine specimens of Tabanidæ.

October, 1914.



In "Insects of Florida," recently published by Prof. C. W. Johnson, two of the above-described specimens captured in 1912 are mentioned as *cymatophorus* O. S. from which *birdiei* differs by its smaller size, clearer wings, wider front, nearly square callus, and shape of third antennal joint.

***Tabanus milleri*, n. sp.**

*Female*—Length  $8\frac{1}{2}$ -10 mm. Palpi white, with a slight yellowish tinge. Face covered by long white hairs. Antennae fulvous, upper angle of third joint obtuse, annuli hardly infuscated. Front coarctate, dark yellow, sometimes almost black; no ocellar tubercle. Callus nearly black, rectangular, a line above. Eyes naked, dark green with a purple reflection and one distinct very dark purple band.

Thorax brown, with the usual lighter stripes. Abdomen black, segment margins yellowish white, expanding into three rows of spots, the medial row consisting mostly of white hairs, the lateral spots frequently fulvous, oblique and extending outward basally. Venter fuscous, margins white. Legs pale yellow, distal half of front tibiae and tarsi black, the other legs less infuscated. Wings hyaline, stigma pale yellow, first posterior cell broadly open.

Dedicated to two young friends whose kindly services furnished me a large number of desirable Tabani.

A comparison of twenty *milleri* captured in Florida, at Mianii, St. Augustine and St. Petersburg, with a great number of *sparus*, taken in New Hampshire, affords no constant separating character except the invariably well-defined eye band in this new species. *Sparus* has no band, only a purple reflection. *Pumilus* has two bands, also other distinct differences.

***Tabanus beatificus*, n. sp.**

*Female*—Length 15 mm. Antennae black, third joint reddish at base, upper angle rectangular. Face, cheeks and palpi black. Front black, shining, callus transverse, protuberant. Connected above is a roundish convex spot extending across the front and nearly surrounded by light gray pollen. Vertex notched. Eyes naked, purple with three green bands. Thorax black, the gray lines scarcely perceptible. Abdomen black, densely covered with



appressed black hairs, except that laterally on the first three segments the hairs are white, forming broad, continuous grayish stripes of equal width with the median interspace. The fourth segment has traces of these stripes in narrow lateral and posterior fringes. Venter and legs very dark brown. Wings dark fuliginous, first posterior cell slightly coarctate.

One specimen received with other Florida Tabani from Rev. Geo. D. Hulst.

***Chrysops ultimus*, n. sp.**

*Female*—Length  $6\frac{1}{2}$  mm. Face yellow, callosities and palpi black. Antennae slender, reddish at base, becoming black apically. Front yellowish pollinose, callosity and ocellar region black. Thorax black, with two greenish median stripes, a bright yellow one just above the wings and two below. Scutellum, abdomen and venter black; an obsolete median dorsal stripe. Legs yellow; joints, distal half of tibiae and tarsi infuscated. Wings: root, costal cell, cross-band and apical spot black. First basal cell completely infuscated, second hyaline. The cross-band is convex outwardly, almost reaching the divarication of the third vein and fills the fourth posterior cell. The fifth is semi-infuscate. The apical spot fills the second sub-marginal cell, except a dot at base, and crosses the first posterior. The hyaline triangle is very narrow, but crosses brokenly the marginal cell to the costa.

Taken at West Palm Beach, Florida, April 18th.

***Chrysops cursim*.**

This species was described in the "Can. Ent." for 1879, Vol. II, Page 36.

In "Kansas Acad. of Science," Vol. X (1885-6) Prof. Williston, never having seen the species, remarks, "I do not see wherein this species differs from *C. pudicus* O. S." Presumably upon that authority *cursim* is placed in the "Tabanidae of the World" as a synonym of *pudicus*.

Although no topotypes of *cursim* have been taken, the species has been found in several localities in New Jersey and Penn., and recognized, notably by Mr. Erich Daecke, who states he has never found intergrades of the two species. A specimen now in the collection of the Boston Soc. of Nat. Hist. was captured by Prof. A. P. Morse at West Peabody, Mass., July 13, 1911.

In comparison, *pudicus* may be said to have a black abdomen with yellow markings and *cursim* a yellow abdomen with black markings. The wing picture of *cursim* is as irregular as that of *delicatulus* and lighter coloured, while that of *pudicus* is dark and well defined.

### THREE NEW SPECIES OF ODONATA.\*

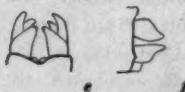
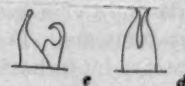
BY HORTENSE BUTLER, ITHACA, N. Y.

This paper contains the descriptions of three new species of dragonflies which were found while working over the material in the Cornell University collection, in the course of the preparation of a handbook of North American dragonflies.

#### *Ophiogomphus sequoiarum*, n. sp.

Total length ♂, 49 mm.; abdomen 34 mm.; hind wing 29 mm.

Total length ♀, 51 mm.; abdomen 34 mm.; hind wing 29 mm.



a-d—*Ophiogomphus sequoiarum*.  
e-f—*Nehalennia carlotta*.  
g-j—*Gomphus abditus*.

October, 1914.

Face and occiput yellowish green, vertex dark brown, with paler transverse oval spot. Prothorax brown, with double median yellow spot on dorsum. Thorax olive green; on the dorsum a moderate stripe of dark brown, contracted on the collar; humeral and antehumeral stripes of dark brown, confluent above, with a narrow dividing line of olive green. Sides of thorax olive green, with a very narrow brown line on the last suture. Abdomen brownish, with hastate yellowish spots on dorsum of segments 1-9; dorsum of segment 10 more broadly yellow; sides of segments 1 and 2 inferiorly yellow, including the auricles; 8 and 9 also yellowish, excepting extreme margin of 8 apically. Legs dark brown, basal three-fourths of femora yellowish and studded with short, dark spines. Appendages yellowish (figs. a and b). Wings hyaline, costa indistinctly paler, stigma black.

\*Contribution from the Entomological Laboratory of Cornell University.

Female much like male, dorsum of the abdomen more broadly yellowish.

Male holotype, Three Rivers, Giant Forest, Tulare Co., Calif. 800-6500 ft., 16th July, 1907; collected by Dr. J. C. Bradley; now in the Cornell University collection. Female allotype from Sonoma Co., Calif., and a male paratype from the same place, both in the Cornell University collection. There are also paratypes of both sexes in the Museum of the Brooklyn Institute of Arts and Sciences.

***Nehalennia carlotta*, n. sp.**

Total length ♂, 24 mm., abdomen 19 mm., hind wing 14 mm. Total length ♀, 28 mm., abdomen 21 mm., hind wing 17 mm.

Face pale with a narrow transverse brown stripe on the base of the labrum, and a similar broader stripe on the clypeus; vertex and occiput metallic bluish green, rear of occiput yellow. Dorsum of prothorax and thorax metallic bluish green, pale beneath, sutures and carinae brown. Abdomen metallic bluish green on dorsum, pale beneath. The metallic green is abbreviated and bilobed on segment 8, and reduced to paired triangular basal spots on 9 and 10. Legs pale, dark line exteriorly on femora and tibiae. Appendages (figs. e and f) light brown. Wings hyaline, stigma light yellowish, .5 mm. long, surmounting one cell. Colouring of female similar, but somewhat paler, the metallic bluish green on the terminal segments is less abbreviated.

Male holotype, female allotype, and several paratypes of both sexes, Saranac Inn, N. Y., July, 1900, collected by Dr. J. G. Needham; in the Cornell University collection.

This is the species referred to in Bulletin 68 of the New York State Museum, pp. 218, 249 and 250, as *Nehalennia gracilis*. A closer examination of the material and a comparison with the figures in Dr. Calvert's recent papers on the species of *Nehalennia* (Ent. News, Vol. XXIV, pp. 310-316, 373-374) prove this to be a new species.

***Gomphus abditus*, n. sp.**

Total length ♂, 47 mm.; abdomen 33 mm.; hind wing 29. Total length ♀, 49 mm.; abdomen 36 mm.; hind wing 32 mm.

Face, occiput and vertex yellow, labrum narrowly bordered with brown, clypeus and middle portion of frons obscurely washed with brown. Prothorax brown with an irregular yellow median

line on dorsum. Thorax brown, marked with yellow as follows; A narrow line on the carina, extended laterally and dilated on the collar; a pair of dorsal stripes rounded above, more pointed at their divergent lower ends; a narrow isolated curved antehumeral stripe and a broad mid-lateral stripe, invaded by a narrow strip of brown extending upward before the stigma; yellow underneath. Abdomen dark brown, with hastate yellow basal spots on dorsum of segments 1-9. Segment 10 light brown, without markings. Sides of segments 1 and 2 wholly yellow, including the auricles; 8 and 9 also yellow, excepting the apical margins. Legs dark brown, paler basally; basal three-fourths of femora yellowish. Appendages (figs. g and h) light brown. Wings hyaline, extreme base indistinctly yellowish; stigma yellowish with brown veins, 3.5 mm. long.

Female similar in colouring; brown markings on the thorax broader; hind margin of occiput nearly straight, entirely hairy. On the male it is bare, except at the ends.

Male holotype, Chicopee, Mass., 20th June; female allotype of same place and date; both in the Cornell University Collection.

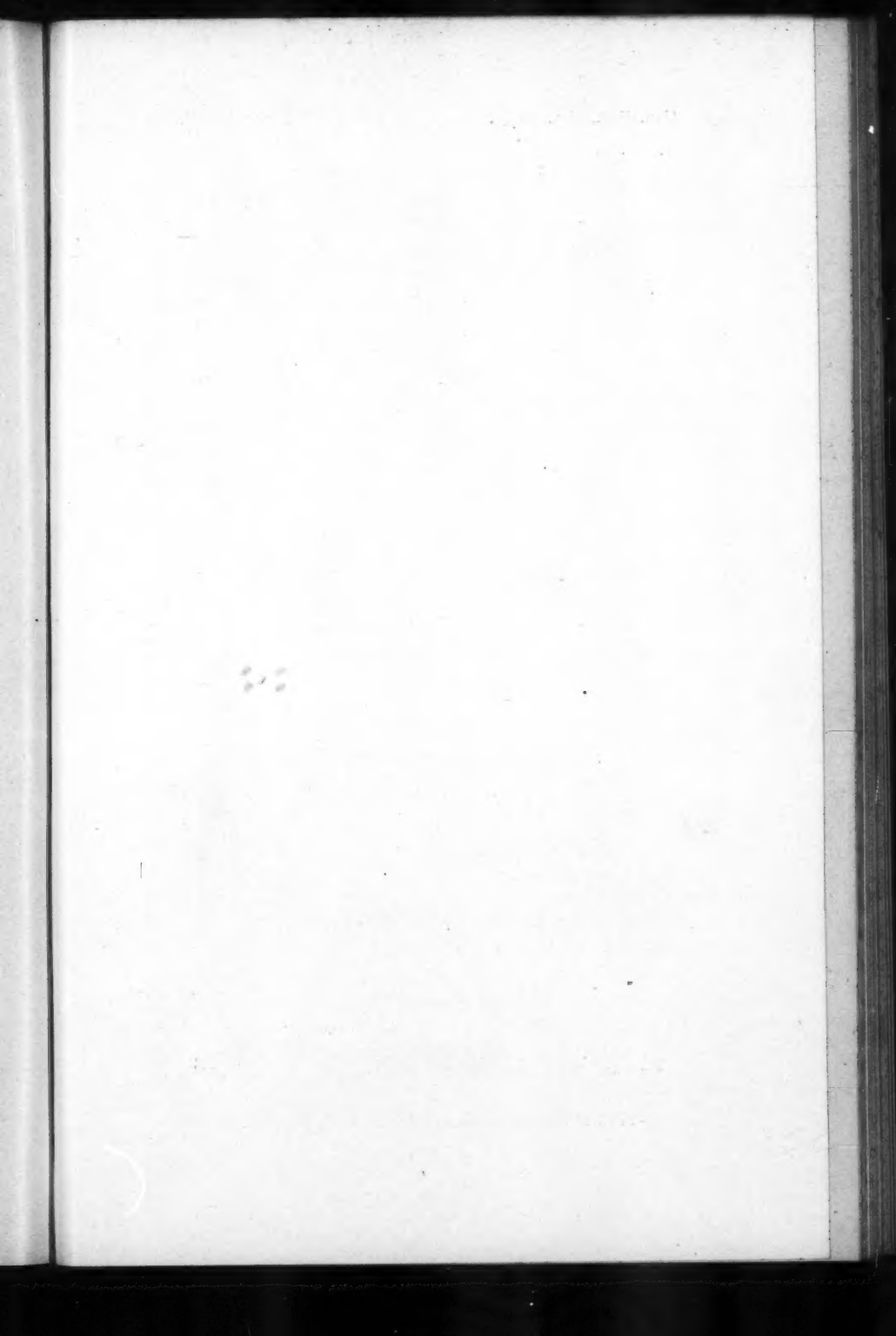
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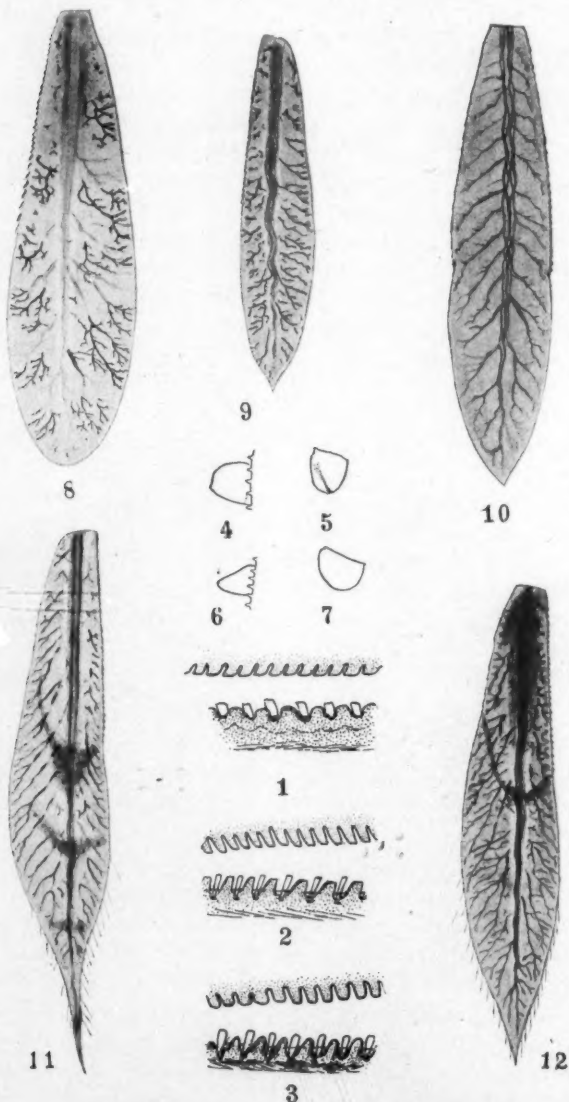
#### ENTOMOLOGICAL SOCIETY OF ONTARIO— ANNUAL MEETING.

The Fifty-first Annual Meeting of the Entomological Society of Ontario will be held at Toronto on Thursday and Friday, Nov. 5 and 6.

There will be a meeting of the Council on Thursday, at 11 a.m., in the University Biological Building, and at 2 p.m. the regular meetings will commence in the lecture-room of the Canadian Institute, 128 College St. A lantern will be available for those who wish to illustrate their papers with slides.

The Society is fortunate in having obtained the services of Prof. J. H. Comstock, of Cornell University, to deliver the public lecture, which will be given on Thursday evening in the Biological Building. His subject will be "The Habits of Spiders," and will be illustrated by lantern slides from Prof. Comstock's own photographs.





NYPHS OF CANADIAN ODONATA.



NEW AND LITTLE-KNOWN NYMPHS OF CANADIAN  
ODONATA.

BY E. M. WALKER, TORONTO, ONT.

**Lestes unguiculatus** Hagen.

Owing to the lack of material this species was very imperfectly described in my recent paper\* on the nymphs of *Lestes* and was not included in the key. Since then I have reared a female imago from a nymph found in an artificial pond close to my house in Wychwood Park, Toronto. I also found another female exuvia. Adults of both sexes were common here and were the only species of *Lestes* present. The reared specimen emerged on July 12, at about 7.30 a.m.

In general appearance the nymph is quite similar to that of *rectangularis* with which it agrees closely in the form and size of the mentum of the labium and the ovipositor. In my key it runs to *rectangularis* and the following alterations may be made in the key to include both species.

DD. Mentum of labium 3.7-4.2 mm. long, rarely reaching beyond middle of hind coxæ; ovipositor just reaching apical margin of segment 10.

F. Inner part of lateral lobes of labium about three times as long as their middle breadth, the marginal teeth about as broad as long, truncated; teeth of middle lobe broader than long, rounded; mental setæ 6 or 7.....*unguiculatus*.

FF. Inner part of lateral lobes of labium about four times as long as their middle breadth, the marginal teeth longer than broad, more or less apically rounded; teeth of middle lobe about as long as their basal breadth; mental setae normally five..*rectangularis*.

*Nymph*.—Labium, when closely applied to ventral surface, extending caudad not quite to the base of the hind coxæ. The slender proximal part of the mentum is about 1.5 times as long as the expanded distal part and just before the latter it is narrowed to about one-sixth of the distal breadth, widening proximad to

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\*Can. Ent., XLVI, No. 6, p. 194.  
October, 1914.

about twice this breadth. Inner part of lateral lobes about three times as long as their middle breadth, the marginal teeth and those of the middle lobe somewhat shorter than in other species, except *congener*, the minute setæ alternating with the latter teeth stout and square-tipped (Pl. XXIII, fig. 1). Row of teeth between the two hooks of the outer part as in *rectangularis*, *disjunctus*, etc. Mental setæ 6 or 7; lateral setæ 3.

Lateral spines on abdominal segments 5-9; 8-13 spinules on lateral carinæ of segment 9. The ovipositor in the reared specimen reaches very slightly beyond the apical margin of segment 10, in the other it just reaches the margin. It is quite similar to that of *rectangularis*.

Gills broadest at about the proximal third, tapering gradually to the slender convexo-acute apices, the breadth at the distal third about two-thirds of that at the proximal third. Transverse bands rather faint in the two specimens examined but probably variable.

The colour pattern is not distinct in the exuviae.

Length of body (without gills) 19.5-20; labium 3.9-4.2; outer-wing-pad 5.3; hind femur 5; gill 9-5; ovipositor 2.

#### ***Enallagma hageni* (Walsh).**

The nymph of this species has been described by Needham (Bull. 68, N.Y. State Mus., p. 254, 1903) but the description is insufficient for the recognition of the species. I have taken the nymphs in large numbers in several localities and have frequently bred them. They are readily known in the field (except from *E. ebrium*) by the spotted gills.

*Nymph.*—Eyes not very prominent (vide Can. Ent., XLV, No. 6, pl. 1, fig. 6); postero-lateral margins of head moderately convex with a few spinules, the the curve of the postero-median excavation somewhat broader and more flattened. Second antennal joint 3-3.5 times as long as thick. Labium with 3 mental setæ (occasionally a rudimentary fourth) and 5 or 6 lateral setæ; distal margin of lateral lobes with 6 or 7 teeth, the posterior (inner) three larger than the others which are minute and ill-defined.

Spinules on lateral margins of abdominal segments 2-8 increasing considerably in size from the base of each segment to the postero-lateral angles, when they form an irregular group, (fig. 32). Lateral appendages of male (pl. XXIII, figs. 6, 7) in profile subtriangular; viewed dorso-ventrally they appear broader than long, their free margins broadly convexly curved; upper surface slightly sulcate.

Gills (pl. XXIII, fig. 8) oblanceolate, broadest at the distal third, apices rounded or convexo-acute; middle gill about three times, lateral gills four times, as long as broad. About two-fifths to one-half of the upper margin of the median gill and about six-elevenths of the lower margins of the lateral gills are spinulose, the spinules being very minute at base but gradually enlarging to the end of the series where they abruptly terminate. Distally the margins are sparsely fringed with very short delicate setæ. The pigmentation consists of 10 or 12 irregular areas in which the tracheal branches are pigmented, separated by unpigmented areas, giving the gills a spotted or blotched appearance to the naked eye. Sometimes there is some diffuse pigmentation along the median axis.

On the dorsum of the abdomen is a pale median line, on each side of which is a more or less diffusely pigmented area, which sometimes forms a definite stripe. Legs more or less spotted, the femora having an anteapical and sometimes a basal dusky annulus, the tibiae also with a sub-basal annulus. There is also sometimes a dark lateral band on the thorax and abdomen.

Ovipositor reaching caudad well beyond the postero-ventral margin of segment 10; it is slightly surpassed by the sharp-pointed valves which reach the middle of the segment.

Length of body (without gills) 14-18; outer wing-pad 3.6-4.3; gills 4.5-7; hind femur 2.8-3.4.

***Enallagma ebrium* (Hagen).**

Among a number of nymphs of *E. hageni*, obtained at Toronto Island, was a single male of *E. ebrium*, which emerged in the morning of June 4, 1914. This was the first individual to emerge



Fig. 32.—Spinules on right margin of seg. 8 in (a) *C. resolutum*, (b) *E. geminatum*, (c) *E. hageni*, (d) *E. carunculatum*.

from this lot of nymphs and I naturally supposed that the others were also of this species as they appeared to be all alike. But not another *ebrium* emerged, all were *hageni*, and on returning a few weeks later to the spot where the nymphs were taken it was found to be swarming with *Enallagmas*, all of which, as far as I was able to determine, were *hageni*.

The nymph of *ebrium* appears to differ from that of *hageni* only in the form of the lateral appendages of the male (pl. XXII, figs. 4, 5). The shape of the head, parts of the labium, gills, etc., are all precisely as in *hageni*. In the single exuvia I have there are three mental setæ and a rudimentary fourth and six lateral setæ on each side; the distal margin of the lateral lobes of the labium bears three teeth of medium size, preceded by 3 or 4 very minute crenulations.

The lateral appendages seen in profile are bluntly rounded and about as deep as long; seen from above they appear much narrower than in *hageni*, especially distally, and the supero-internal surface is distinctly though shallowly and obliquely sulcate.

Length of body (without gills) 14.5; outer wing-pad 4.5; gills 6.8; hind femur 3.6.

#### ***Enallagma geminatum* Kellicott.**

I have bred a single female of this species, the nymph of which was taken in Grenadier Pond, Toronto, and transformed on July 2, 1914. In form it resembles the preceding two species but differs in the slenderer, unspotted gills and the less conspicuous spinules of the lateral margins of the abdominal segments which form a single series terminating in a pair at the postero-lateral angles. (Fig. 32, b.) In this respect it approaches *Coenagrion resolutum*.

The ovipositor is relatively longer than in *E. hageni*, nearly reaching the postero-ventral margin of segment 10, the apices of the valves just reaching this margin.

Labium with 3 mental setæ on each side and an additional rudiment on one side (4, occasionally 3, according to Needham); lateral setæ 5. Distal margin of lateral lobes with 3 rather large teeth preceded by a very short and indistinctly denticulated margin.

Lateral gills (pl. XXIII, fig. 9) slender, about six times as long as the greatest breadth, which is at about the distal third; apices acute. About six-elevenths of the upper margin is spinulose. Distad of this the margins are almost devoid of setæ. Pigmentation confined to the tracheal branches, scattered but not grouped to form blotches. The median gill is absent in the single exuvia I possess.

Length of body (without gills) 11; outer wing-pad 3.6; gill 4.2; hind femur 2.7.

### **Coenagrion resolutum** Selys.

I found this species transforming at Prince Albert, Sask., June 24, 1913, and reared both sexes. I also reared a female at Toronto, which emerged on June 1, 1913, and a male from Wilcox Lake, Ont., which transformed on June 1, 1914. The following description was prepared from the exuviae.

*Nymph*.—The nymph resembles that of *Ischnura verticalis* very closely but can be distinguished by the shape of the gills, and the lateral appendages of the male, and in the majority of cases by the larger number of mental setæ.

Form moderately slender, being about the same as in *I. verticalis*, *E. hageni*, *E. geminatum*, etc., but less slender than in *E. signatum* and *E. pollutum*. Eyes moderately prominent; posterior margins of head broadly rounded, forming where they meet the eyes a very slight emargination; six or eight spines of various sizes can be seen on the posterior margin from above and a variable, usually larger, number near the margin in ventral view. There is also a series of spinules of very variable number (4-12) along the postero-ventral margin of the eye. Antennæ generally 6-jointed, the 7th. joint, when present, seldom very distinctly indicated. The second joint is 4 or 4.5 times as long as thick.

Labium extending back to about midway between the front and middle coxæ; mentum subtriangular, the apical breadth about four-fifths of the length, the sides in the proximal two-thirds straight and diverging at an angle of about 45°, in the distal third feebly arcuate and diverging at a somewhat greater angle; median lobe strongly depressed, convexo-obtusangulate; mental setæ 4-6; lateral lobes shaped as in *Ischnura* and *Enallagma*, the distal margin



with 5 teeth, which increase in size caudad, and a short end-hook; movable hook half as long as the lateral lobe; lateral setæ 6 or 7.

Lateral margins of abdominal segments 2-9 with a single, nearly straight series of small spinules, which increase somewhat irregularly in size caudad on each segment (fig. 32, a). Gills (pl. XXIII, fig. 10) unpigmented (in the reared female from Prince Albert there is a transverse dark streak near the division), 4.5-5 times as long as the greatest breadth, which is a little distad of the middle; sides distally arcuate, apices acute but not acuminate. There is a distinct transverse division a little beyond the middle, proximad of which the lateral margins are spinulose, distad smooth with fine hairs. All the exuviae except that of the female reared at Prince Albert are practically unpigmented. This one is brownish, the abdomen with a median pale line between two darker ones and the femora each with a pale anteapical annulus.

Length of body (without gills) 13-14, outer wing-pad 3.9-4.5; gills 5-6; hind femur 3.0-3.6.

The most accurate means of distinguishing the nymph of this species from that of *Ischnura verticalis* is the form of the gills, which in the latter species, are much more tapering and somewhat acuminate apically and the division is proximad of the middle (pl. XXIII, fig 12). The tracheal branches are also more or less pigmented and there is at least one dark transverse streak. The males can also be distinguished by the form of the lateral appendages (fig. 33), which in *resolutum* are deeper and in profile present a broad posterior surface, not represented in *verticalis*.

From the nymphs of *Enallagma* that I possess, viz. *E. calverti*, *hageni*, *ebrium*, *geminatum*, *carunculatum*, *signalum* and *pollutum*, *C. resolutum* differs in the arrangement of the spinules upon the lateral margins of the abdominal segments, which form a single series throughout, not being crowded into a group at the postero-lateral angles. This difference is very slight in the case of *E. geminatum* (fig. 32, b) in which this group of spinules is reduced to a pair. *Resolutum* also differs from these species of *Enallagma*, except *E. calverti*, in the larger number of mental and normally also of lateral setæ, there being usually in *Enallagma*,

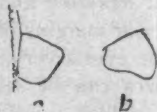


Fig. 33.—*C. resolutum* male. lateral appendage; (a) profile, (b) ventral view.



3 mental and 5 lateral setæ. In *E. calverti* there are four mental and 6, or sometimes 5, lateral setæ. *Calverti*, however, is much larger with very dark gills, and in all the *Enallagmas* the gills are more or less pigmented. *E. geminatum* is the most like *C. resolutum* of the species mentioned, but the branches of the tracheae of the gills are less regularly distributed and are distinctly pigmented, and the lateral lobes of the labium have only five lateral setæ (as known at present). In *carunculatum* the lateral appendages of the male are much like those of *resolutum* but the spinules of the abdominal segments are much coarser (fig. 32, d)

### ***Ischnura cervula* Selys.**

Several nymphs of this species were taken by the writer from the reedy margin of a large pond in the Bow Valley, at Banff, Alta. A female was reared from one of these nymphs at the Biological Station, near Nanaimo, Vancouver Is., emerging on July 20, 1913.

Form of body identical with that of *I. verticalis* the only distinctive character being found in the shape and pigmentation of the gills.

Eyes moderately prominent, posterior margins of head broadly rounded, forming where they meet the eye a very slight emargination. Posterior surface of head with numerous spines, and a series of minute spinules of variable number along the postero-ventral margin of the eye. Antennæ 7-jointed, the second joint 4-4.5 times as long as thick. Labium extending back to about midway between the bases of the first and second coxæ, sides of mentum almost straight, there being only a very slight increase in the angle of divergence at about the distal three-fifths; breadth at base of lateral lobes about five-sixths of the length; median lobe not very strongly depressed, bluntly obtusangulate; lateral lobes shaped as in *I. verticalis*, *C. resolutum*, etc., distal margin with two or three very minute teeth, preceding three much larger ones; end-hook a trifle larger than in *verticalis*; movable hook half as long as the lateral lobe; mental setæ 4 (rarely 5 on one side); lateral setæ 5 or 6.

Lateral margins of abdominal segments with a series of very short black spinules, forming several irregular rows. Gills (pl.

XXIII, fig. 11) gradually widening from base to distal third, where the breadth is about one-fifth of their length, apically acuminate, terminating in a long slender point; division slightly proximad of the middle. There is a pale ill-defined median area of greater or less extent, the peripheral parts being more transparent. The dark pigment is distributed along the median tracheæ, the lateral branches beyond the pale area, and in three transverse, more or less crescentic bands, one at the division, another near the apex and a third between these two; one of these, the basal or the middle band is more conspicuous than the others. The apical band is faint and may be scarcely recognizable.

The colour-pattern in other respects is entirely similar to that of *I. verticalis*. All my specimens are rather conspicuously marked but it is probable that the same variations are found in *I. cervula* as in *I. verticalis*. The general colour of alcoholic specimens is a moderately dark brown, spotted and banded with pale yellowish. The dorsum of the head is marked with a number of pale roundish spots, the thorax is more or less distinctly variegated with pale markings and the abdomen longitudinally striped, there being a pale median line between two broader dark bands, and on each side a dorso-lateral and a lateral pale streak. The legs are pale, distinctly ringed with brown, both femora and tibiæ being darkened at base, and having each two dark annuli.

Length of body (without gills) 11.2-12.5; outer wing-pad 3.6-3.9; gills 6; hind femur 3.

#### EXPLANATION OF PLATE XXIII.

Fig. 1. *Lestes unguiculatus*, teeth of median and lateral lobes of labium, greatly magnified.

Fig. 2. *Lestes forcipatus*, teeth of median and lateral lobes of labium.

Fig. 3. *Lestes rectangularis*, teeth of median and lateral lobes of labium.

Fig. 4. *Enallagma ebrium*, right lateral appendage of male nymph, profile view.

Fig. 5. *Enallagma ebrium*, same, dorsal view.

Fig. 6. *Enallagma hageni*, right lateral appendage of male nymph, profile view.

Fig. 7. *Enallagma hageni*, same, dorsal view.

Fig. 8. *Enallagma hageni*, lateral gill.

Fig. 9. *Enallagma geminatum*, lateral gill.

Fig. 10. *Coenagrion resolutum*, lateral gill.

Fig. 11. *Ischnura cervula*, lateral gill.

Fig. 12. *Ischnura verticalis*, lateral gill.

(To be continued)

### NEW SOUTH AMERICAN MEMBRACIDÆ.\*

BY W. D. FUNKHOUSER, ITHACA, N. Y.

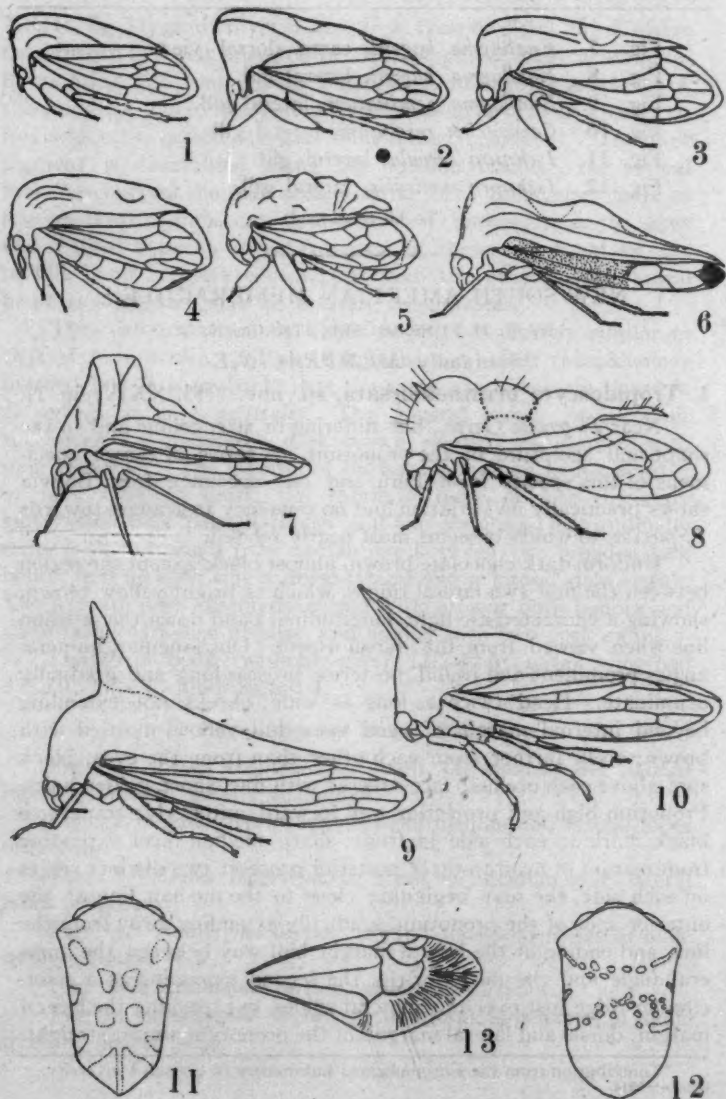
Subfamily MEMBRACINÆ.

#### 1. *Tropidoscyta brunneidorsata*, sp. nov. (Pl. XXIV, fig. 1).

Near *T. pæcila* Germ., but differing in size, colour and in the shape and sculpture of the pronotum. A series of eleven specimens of this species from Peru and one specimen from Bolivia shows practically no variation and no tendency to gradate towards *T. pæcila*, to which it seems most nearly related.

Uniform dark chocolate brown, almost black, except the region between the first two lateral ridges, which is bright yellow brown, showing a characteristic light longitudinal band down the median line when viewed from the dorsal aspect. Obtriangular, humeral angles prominent and round, posterior process long and gradually acuminate. Head twice as long as wide; cheeks not extending beyond internal margin of eyes; eyes dull yellow, mottled with brown; ocelli farther from each other than from the eyes; black spot above each ocellus; face covered with fine, short, golden hairs. Pronotum high and projecting well forward anteriorly; transverse black mark on each side in front; sharp median keel extending from margin of head to tip of posterior process; two distinct ridges on each side, the first beginning close to the median line at the anterior apex of the pronotum, gradually extending away from the line, and ending at the lateral margin half way between the humeral angle and the posterior tip, the second extending as a semi-circular ridge just over the humeral angles, not reaching the lateral margin; dorsal and lateral margins of the pronotum almost straight,

\*Contribution from the Entomological Laboratory of Cornell University.  
October, 1914



SOUTH AMERICAN MEMBRACIDÆ.

not sinuate or bulbous; posterior extremity reaching just beyond internal angle of tegmina. Entire pronotum very finely punctured and sparsely covered with short golden hairs. Tegmina black at base, gradually becoming brown in middle, with apical third yellow hyaline; three discoidal areas; two transverse rows of light brown spots in central portion, three spots in first row and six in second. Under surface of body black. Legs dark brown, tarsi yellow; first and second pairs of tibiae much flattened.

*Type*.—Female.

Length, including closed tegmina: Female 4 mm., male 3.2 mm.; width between humeral angles, female 1.8 mm., male 1.6 mm.

*Locality*.—Marcapata, Peru.

The male, besides being smaller, is much darker and more distinctly punctured, and the wings lack the two transverse rows of spots.

2. ***Tropidoscyta binotata***, sp. nov. (Fig. 2).

Close to the preceding, but larger and differs in sculpture and colour. May be easily recognized by the single ridge over each humeral angle, and by two white spots on the median dorsal line.

Head, body, wings and legs uniform yellow, except eyes, which are dark brown, and two white spots on median ridge of pronotum, one just before the middle and one just before the extremity of posterior process; each white spot having a black mark at each end. Head about twice as long as wide, loræ extending slightly beyond internal margin of eyes; finely punctate and pubescent; ocelli farther from each other than from the eyes. Pronotum strongly projecting forward, finely and deeply punctate and sparsely pubescent with golden hairs; median ridge strong and percurrent, very lightly sinuate; posterior process gradually acuminate, somewhat depressed at apex and extending beyond internal angle of tegmina and beyond abdomen; one strong lateral carina on each side, starting at extreme anterior apex of pronotum and extending to a point on the lateral margin, one-third way from humeral angle to posterior end. Tegmina opaque yellow, without markings, base and costal areas densely punctate; three discoidal areas. Legs yellow; fore and middle tibiae much flattened; hind tibiae thin, with black-tipped spines. Tarsi concolorous yellow.



*Type*.—Female.

Length from anterior apex to tip of tegmina, female 5 mm., male 4.2 mm.; width between humeral angles, female 2.2 mm., male 1.8 mm.

*Locality*.—Espírito Santo, Brazil.

The male is somewhat darker, the veins of the tegmina much darker and more prominent, the basal half of tegmina and the under surface of the body deep ferruginous or black.

3. *Tropidoscyta maculata*, sp. nov. (Fig. 3).

Near *T. minor* Buckt., but differs in the sculpture of the pronotum, in the markings, and in the venation of the tegmina. May be recognized by the large white spot on the median dorsal line and by the fact that only two discoidal cells are present in the tegmina. This latter character would suggest the genus *Leioscyta* of Fowler, but the position of these cells is quite different from the forms figured by that author, and the high, rough, carinate pronotum at once prevents its admission to his genus.

Deep chocolate brown, except anterior half of median dorsal ridge, which is light yellow brown, spot behind this white hyaline, and apex of posterior process almost black. Head twice as long as wide, very dark brown, faintly punctured, densely pilose with long yellow hairs; ocelli yellow white, farther from each other than from the eyes; eyes brown. Pronotum thickly punctate and sparingly pilose; high percurrent median carina compressed into a sharp thin keel in the middle; one high, sharp, lateral carina on each side, beginning at extreme anterior apex and ending in about the middle before reaching the lateral margin; posterior process acute, extending just beyond internal angle of tegmina. Tegmina black at basal third, becoming ferruginous in middle and smoky hyaline at apical third; base finely punctate; veins somewhat pubescent; two discoidal cells. Legs ferruginous; first and second tibiae flattened; tarsi flavous.

*Type*.—Female.

Length, female 4 mm.; male 3.7 mm.; width, female 1.8 mm., male 1.5 mm.

*Locality*.—Peru.



The male is uniformly darker, with the white dorsal spot and the apical ends of the tegmina consequently more distinct.

4. *Bolbonota lutea*, sp. nov. (Fig. 4).

A fine, handsome species near *B. globosa* Fairm. In shape and size it much resembles *B. insignis* of Fowler, but differs in colour and sculpture, Fowler's species being shining, black and irregularly rigid, while *lutea* is uniform lemon yellow and almost smooth.

Head, body and legs light lemon yellow throughout. Head comparatively smooth, pubescent, twice as long as wide; ocelli slightly protruding; clypeus roughly diamond-shaped, with lateral angles extending beyond line of loræ, apex produced. Pronotum smooth, densely covered with yellow pubescence; humeral angles prominent and obtuse; percurrent median ridge high and lightly sinuate until just before the posterior apex, where it is abruptly declivous; posterior process blunt and triangular, just reaching internal angle of tegmina; three faint, short ridges over each humeral angle, the middle one most prominent; a depressed constriction just posterior to these ridges on each side of median carina, forming an apparent bulbous swelling before and behind it. Tegmina comparatively narrow, exposing almost one-fourth of the abdomen below; flat, opaque; yellow slightly punctate and pubescent at base. Abdomen yellow and pubescent. Legs concolorous yellow with very fine black-tipped spines at apex of hind tibiae.

*Type*.—Female.

Length 4.2 mm., width 2.6 mm.

*Locality*.—Espírito Santo, Brazil.

Described from four females.

5. *Bolbonota nigrata*, sp. nov. (Fig. 5).

Near *B. melaena* Germ., but differs in the structure of the dorsal surface and in being entirely without spots on pronotum or tegmina.

Entirely shining black, except extreme tips of tegmina, which are hyaline; very rough and corrugated. Head rough, finely punctate, sparsely pubescent; ocelli white, equidistant from each other and from the eyes; eyes dark brown, edged with white. Pronotum deeply and coarsely punctured, covered with irregular ridges and

bulbs. Median ridge percurrent, sharp and sinuate; humeral angles prominent; two large bulbs on each side median ridge, ridge thin between these bulbs; a Y-shaped ridge between humeral angle and first lateral bulb; posterior process blunt, subtriangular, slightly depressed, extending just beyond internal angle of tegmina. Tegmina velvety black, veins somewhat raised, extreme tip of marginal border hyaline. Abdomen black; segments edged with fine white line. Legs black; hind tibiae strongly spined; tarsi flavous.

*Type*.—Female.

Length, female 3.6 mm., male 2.8 mm.; width, female 2.4 mm., male 2 mm.

*Locality*.—Bolivia.

The male differs only in size.

Subfamily *SMILIINÆ*.

6. *Metheisa sinuata*, sp. nov. (Fig. 6).

This species varies greatly in size and colour; the size ranges from four to seven millimeters, and the colour from light cinnamon brown to almost black. The sculpture and pattern of the pronotum, however, are constant. The pronotum is rather more elevated than in the other species of this genus, and is broadly sinuate in the middle; the tegmina usually show four apical and two discoidal cells, though in one specimen one of the discoidal cells is absent; the wings have four apical and no discoidal cells.

Head rough and sculptured; subtriangular, apex very sharp; clypeus almost square, somewhat pubescent; face deeply pitted; proximal margin of the head produced into a ridge. Prothorax elevated; median keel high and thin, sinuate in middle between rounded dorsal elevations, on either side of these elevations and between them a white patch, very distinct, even though the body colour may vary; on each side of pronotum three prominent ridges, deeply and coarsely punctate between them; humeral angles prominent and blunt; posterior process sharp, decurved, reaching just to the apex of the tegmina. Tegmina nearly half concealed by the pronotum; basal two-thirds opaque and roughly punctured; apical third hyaline, black spot at tip. Abdomen extending about

half as far as the tegmina, usually hidden by the opaque basal portion of the latter. Legs usually concolorous.

*Type*.—Female.

In the type specimen the colour is uniform light brown, with the pronotal ridges and the head slightly darker and shining. The males are, as a rule, darker and more inclined to show mottled patches.

Length (type) 7 mm.; width 2.5 mm.

*Locality*.—Peru.

(To be continued.)

### NEW GENERA AND SPECIES OF SAWFLIES.\*

BY ALEX. D. MACGILLIVRAY, UNIVERSITY OF ILLINOIS, URBANA, ILL.

The greater part of the following descriptions have been in hand for some time. Some of the species are of economic importance. The descriptions are offered at this time so that the names can be used by others.

#### *Simplemphytus*, n. gen.

Antennæ with nine segments; front wings with the free part of Sc<sub>1</sub> present, but short, the radial cross-vein present and the radio-medial cross-vein wanting; the medio-cubital cross-vein and media separating from Sc+R+M at the same point; the third anal vein deeply bowed at middle; the free part of the second anal vein present; the second abscissa of Cu subequal in length to the free part of M<sub>4</sub>; the medio-cubital cross-vein and the free part of M<sub>3+4</sub> parallel; the hind wings with the spur at the distal end of the cell R<sub>1+2</sub> wanting, minute, or large; the free part of R<sub>4</sub> and the transverse part of M<sub>2</sub> wanting; the first anal cell petiolate and shorter than the cell in front of it; the posterior metatarsus shorter than all the following segments together. Type *Simplemphytus pacificus*, n. sp.

This genus is closely related to *Emphytus* in habitus and structure.

#### *Simplemphytus pacificus*, n. sp.

*Female*.—Body coal-black, with the distal third of the front femora, the front tibiae, the front metatarsi, and the knees of the

\*Contributions from the Entomological Laboratories of the University of Illinois, No. 41.  
October, 1914

middle legs, pale rufous or whitish; the antennæ short with the third segment longer than the fourth, the fourth and fifth subequal; the head, including the clypeus and labrum, densely punctured and setaceous, less abundant on the postocellar area; the malar space broad, the clypeus deeply roundly emarginate, the labrum set in the emargination; the supraclypeal area elevated, convex; the antennal furrows broad depressions; indistinct, line-like marks at the occiput; the ocellar basin broad, diamond-shaped, enclosing the median ocellus and extending to the median fovea, which is round, shallow, indistinct, and still less distinct in the male; the mesonotum, the metanotum, the pleuræ, and the pectus polished; the abdomen polished, densely setaceous; the saw guides convex above, straight on the proximal half below, convex on the distal half, joining the upper margin at the middle of the distal end and forming a pointed but bluntly rounded distal end. Length 7—9 mm.

*Habitat*—Troutdale, Oregon.

Described from specimens received from Professor H. F. Wilson, who reports it as boring into the stems of cherry.

#### **Profenusa, gen.**

Antennæ with nine segments; front wings with the free part of  $Sc_1$  tuberculate; the radial cross-vein, the radio-medial cross-vein, and the free part of  $R_4$  and  $R_5$  present; the medio-cubital cross-vein separating from  $Sc+R+M$  near the point of origin of the free part of  $M$  and strongly divergent caudad with the free part of  $M_{3+4}$ ; the anal cells petiolate; the scar of the free part of the third anal vein wanting; the free part of  $M_{4+Cu_1}$  located midway between the mediocubital cross-vein and the free part of  $M_{3+4}$ ; the hind wings with the cell  $R_{1+2}$  wanting; the free part of  $R_4$  and the transverse part of  $M_2$  wanting; the free part of the second anal vein present. Type, *Profenusa collaris*, n. sp.

This genus is closely related to *Messa* Leach, from which it is differentiated by the presence of the radio-medial cross-vein.

#### **Profenusa collaris, n. sp.**

*Female*—Body black, with the clypeus, labrum, malar space, the mandibles, the first segment of the antennæ, the tegulæ, a narrow margin to the pronotum, and the legs, for the most part,

whitish. The prothorax, except the parts named, the cephalic part of the mesopleuræ, and the pectus, rufous; the posterior femora more or less shaded with fuscous; the head smooth with antennal furrows interrupted on the middle of the face; the furrows surrounding the postocellar area deep and distinct; the vertical furrows not reaching the occiput; the median ocellus placed on a flat depression; a pit above the antennal socket; the median fovea minute but distinct; the clypeus truncate; the first and second antennal segments subequal, the third segment subequal to one and two together and longer than four; the saw-guides with the dorsal and ventral margins converging and the apex bluntly pointed; the male differs in having the rufous part of the thorax inclined to whitish and extending over the entire pleuræ, the venter of the abdomen and a broad band on the lateral part of the dorsal aspect, broader behind, sometimes fused on the meson, whitish; the posterior femora not fuscous. Length 3 to 4 mm.

*Habitat*.—Massachusetts and New York.

This insect was first received May 10th, 1909, from Mr. Ralph W. Curtis, Assistant Superintendent of Parks of Boston, Mass., who reported the larvæ as mining the leaves of *Cratægus*. Larvæ and adults were collected during the summer of 1911 by Mr. Andrew Rutherford in the Cascadilla ravine, Ithaca, N. Y., on *Cratægus*. It was also received during 1911 from Mr. P. J. Parrott, who reported it from Geneva, N. Y., where the larvæ were serious pests, mining the leaves of cherry.

*Fenusa*.—It has been shown by Mr. S. A. Rohwer that the type of this genus is *Tenthredo* (*Emphytus*) *pumila* Klg., which is congeneric with *Kaliosysphinga dohrnii* Tischbein, the type of *Kaliosysphinga*. *Fenusa* will therefore replace *Kaliosysphinga*, and another name must be used for the group of species hitherto included under *Fenusa*.

*Messa*.—It has also been shown by Mr. S. A. Rohwer that the type of the genus *Messa* Leach, a name hitherto erroneously associated with certain species of Nematinae, is *Tenthredo* (*Emphytus*) *hortulana* Klg., which is one of the species formerly associated with the generic name *Fenusa*. This name should, therefore, be used for those species and includes the American *Fenusa ambigua* Nort.



***Euura maculata*, n. sp.**

Body black, with the head except a quadrangular spot about the ocelli and extending to the eyes, prothorax, margin of the lobes of the mesonotum narrowly, upper half of the pleuræ, tegulæ, legs, abdomen, except above at base, and saw-guides, except at apex, resinous; frontal crest indefinite and apparently wanting; median fovea a minute pit; saw-guides large, upper and lower margins slightly converging, and broadly rounded at apex. Length 7 mm.

*Habitat*—Collected by Professor J. S. Hine at Columbus, Ohio, and bears the number 169.

The form of the frontal crest distinguishes this species from all of the described eastern species.

***Euura minuta*, n. sp.**

Body black, with head except a spot around the ocelli and occiput, pronotum, tegulæ, legs, and venter of abdomen, luteous; saw-guides straight above and broadly convexly rounded below, truncated at apex; frontal crest distinct and broken at middle; median fovea indefinite, represented only by a shallow depression in the frontal crest. Length 4 mm.

*Habitat*—Ames, Iowa. Professor E. D. Ball, collector.

This species is related to *nigra* Prov., from which it is separated by the colour of orbits and to *nodus* Walsh, from which it is separated by the indefinite median fovea.

***Metallus bethunei*, n. sp.**

*Female*—Body black, with the two basal segments of the antennæ more or less, the trochanters, and the legs beyond the knees, white; the distal half of the posterior tibiæ sometimes more or less infuscated; the ocellar furrow adjacent to the median ocellus; the interocellar furrow wanting; depressed area behind the median ocellus broad; median fovea a broad, deep pit; lateral fovea distinct from lateral fovea; body polished with sparse setigerous punctures; the front not punctate around the base of the antennæ; the stigma twice as long as broad; front wings with the free part of  $M_4+Cu_1$  joining the cell  $M_4$  at middle; the saw-guides straight above, somewhat oblique below, broadly obliquely rounded point at apex above. The antennæ of the male is longer and the segments broader and compressed. Length, 4 mm.



*Habitat*—Jordan Harbour and Saint Kits, Ontario, Canada.

Received from Mr. Lawson Caesar, who bred it from a leaf-mining larva on blackberry. The species is named for the Rev. C. J. S. Bethune. It is closely related to *rubi*, but readily separated from that species by the more oblique and blunter saw-guides.

#### BOOK REVIEW.

THE NATURAL HISTORY OF THE FARM. A Guide to the Practical Study of the Sources of our Living in Wild Nature. By James G. Needham, Professor of Limnology, General Biology and Nature Study in Cornell University, Ithaca, N. Y. The Comstock Publishing Company, 1913. \$1.50.

Like Professor Needham's other writings this little book is marked by a freshness of viewpoint and a vigour of style entirely his own. Its aim is to give to the student something of that practical knowledge of nature possessed by the Indian and the pioneer, that personal acquaintance with common wild things, which was indispensable in the days when men were dependent upon their own hands for obtaining a living from the wilderness.

But it tells not only of the plants and animals from which we get our food, clothing and shelter, their relations to Mother Earth and to one another, but throughout the book the value of the beautiful in nature as an educational factor is never forgotten. It is this feature, that in our opinion gives the book its chief charm. The author's intimate first-hand knowledge of out-door nature and his keen sympathy with all her moods, are reflected throughout the book in such a way that the reader can scarcely fail to feel some of the charm of the wildwood, if he is at all responsive to its influence. Nor is there the slightest touch of that sentimentality which is apt to result from an attempt to record the charm of Nature in words.

The course of studies outlined, is divided into three parts, adapted respectively for the fall, spring and summer terms of the college-year; each part including 16 exercises. The studies cover a wide range of subjects and are all designed to bring the student into close contact with nature in all seasons and all

kinds of weather. They are not intended to give all the information demanded of the student. This is to be acquired at first hand. They are merely suggestive, serving to direct the student's powers of observation and to give coherence to the knowledge he obtains in the field. At the close of each chapter a definite programme of work is given, including suggestions for recording observations by means of notes, diagrams, etc. There is also included a number of optional exercises for the individual student, to be pursued independently.

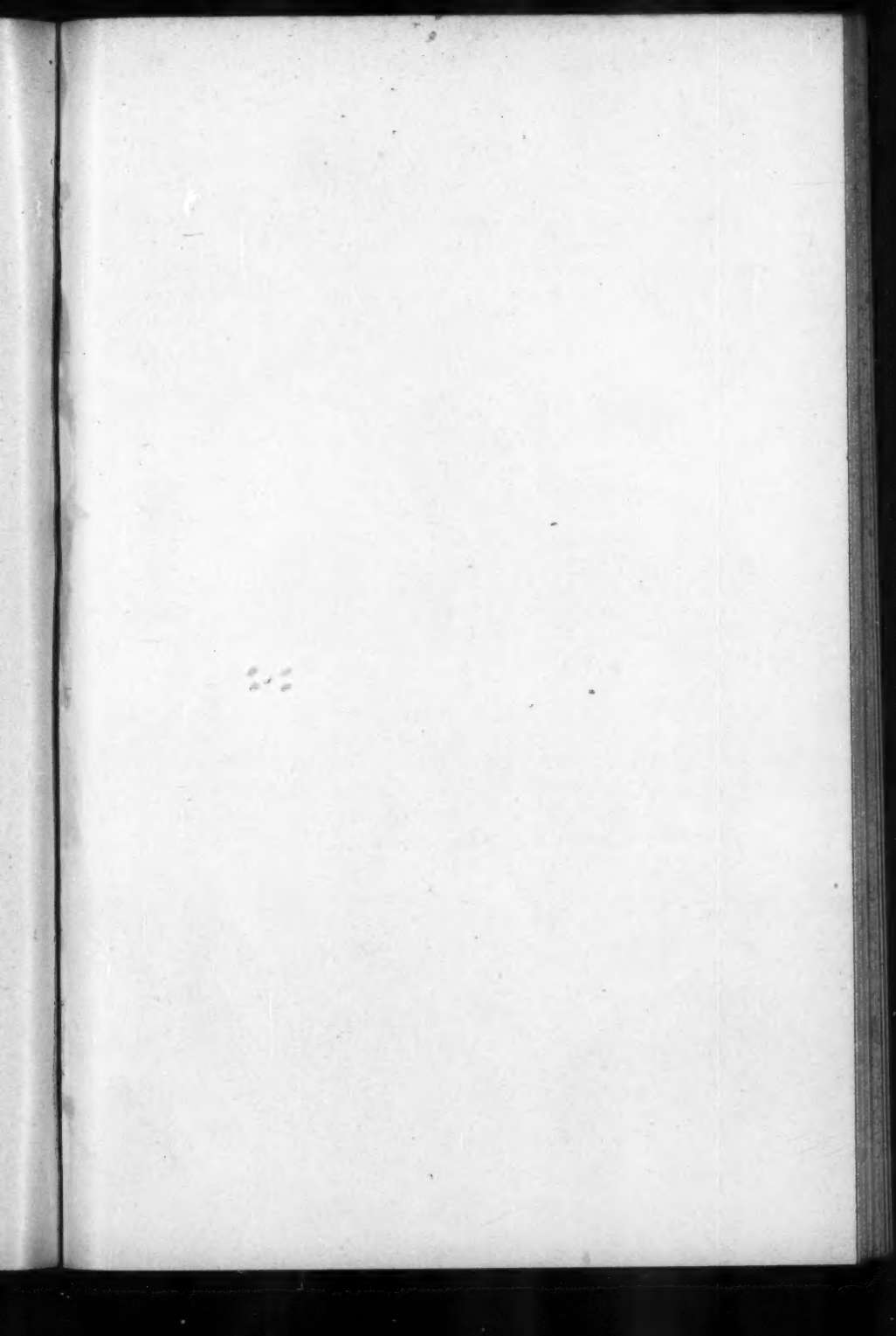
An idea of the character of the studies may be obtained by glancing at the table of contents. In Part I we find such titles as "The wild fruits of the farm," "The farm stream," "The November seed crop," "The wild mammals of the farm," etc.; in Part II, "The lay of the land," "Winter activities of wild animals," "Fiber products of the farm," "The fence-row"; and in Part III, "The progress of the seasons," "The clovers," "Some insects at work on farm crops," "Insects molesting farm animals," "Out in the rain," "The population of an old apple-tree," etc.

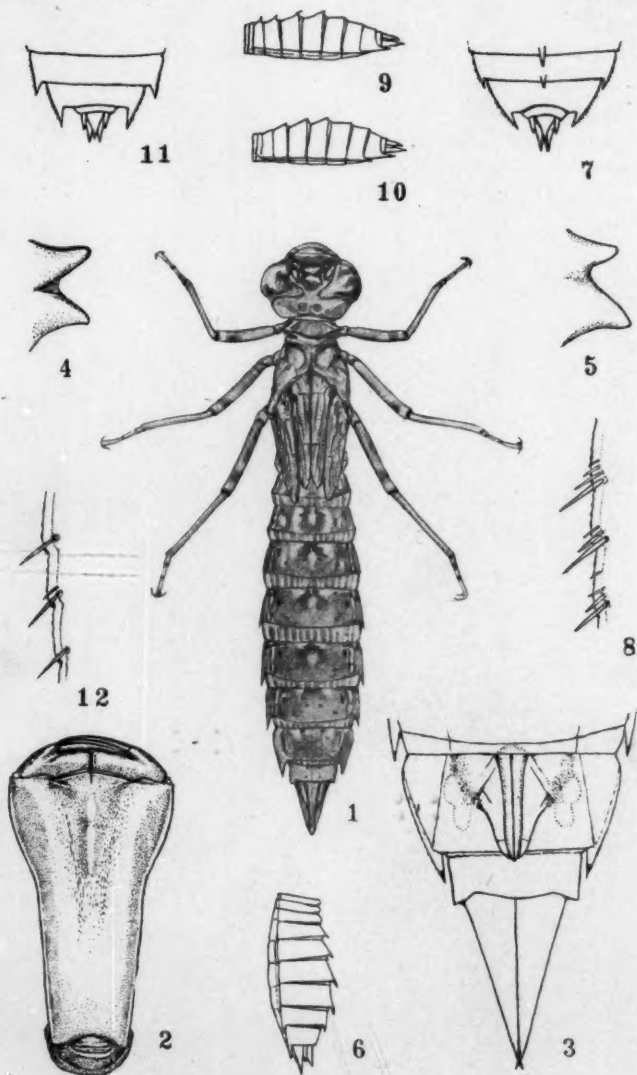
As several of these titles suggest, there are many references to insects and their ways. These are, for the most part, necessarily of a very general character, but mention may be made of a useful table for the recognition of aquatic insects in the immature stages, given in connection with the study of "The farm stream".

The book is illustrated by numerous well-chosen cuts, which with a few exceptions, are accurate and effective. It should be in the hands of every teacher of Nature Study.

The types of the following species of Orthoptera, described by the writer, the custody of which was not indicated in the original descriptions, have been deposited in the Royal Ontario Museum, Toronto: *Centhophilus pallidipes*, *Orchelimum manitobense*, *Nemobius griseus*, *Nomotettix borealis*, *Trimerotropis huroniana*, *T. sordida*, *T. longicornis*, *Podisma nuda* (= *Asemoplus nudus*) and *P. glacialis canadensis*.

Mailed October 10th, 1914.





NYMPSHS OF CANADIAN ODONATA.

